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## Gender Ratio and Stereotype Threat in an Academic Setting

The study focused on the impact of stereotype threat effectiveness and gender differences in political knowledge. Sex ratio was manipulated to create conditions in which women significantly outnumbered men, similar to the overall gender ratio of women to men at Creighton University. Seventy-seven participants, 52 female and 25 male, were randomly assigned into two conditions, both of which prompted stereotype threat but differed in the gender ratio. One condition was 75% women to 25% men and the other was an equal gender ratio. The participants were given a ten question quiz of political knowledge followed by a short series of self-report questions. To elicit threat, participants were told that women had generally performed less well on the same quiz in the past. The results indicate no significant difference in female performance across conditions, but in general, men scored significantly higher than women. Though gender ratio was not found to be a protective factor against stereotype threat, data pertaining to perceptions of same sex and opposite sex performance suggests the real nature of the stereotype indicating a larger scale issue with stereotyping in society and the education system

Gordon Allport regards a stereotype as “a fixed mark upon [a] category” (Allport, 1954) in his groundbreaking publication, *The Nature of Prejudice*. His work is largely responsible for the introduction of the real impact that stereotypes and prejudices have on our psychological processes and their function in society. He discusses stereotypes as descriptors of groups that group members internalize and adopt which influences behavior, and at the same time, he notes that stereotypes change with the passage of time. Through Allport’s pivotal study and exploration of stereotypes, other researchers have been able to grasp some understanding as to how stereotypes truly manifest in our behavior. Allport,

rather far ahead of his time, successfully laid the groundwork for modern observation of stereotypes, including theories like stereotype threat

Steele (1997) has defined stereotype threat as a threat that is situational and capable of affecting the members of any group that has been labeled with a negative stereotype. When presented with a task or situation in which one’s group has a negative stereotype, members of that group will respond with fear of being reduced to these negative stereotypes or being treated in a stereotypical manner. Steele (Steele, 1997; Steele & Aronson, 1995) focused his research on the intellectual performance of African-American students on difficult verbal tasks in which

some participants were presented with a stereotype threat. His research began with reasoning that African American students are unfairly stereotyped as performing worse on measures of intellectual ability and the students “face the threat of confirming... a negative societal stereotype” (Steele & Aronson, 1995) when asked to complete such a task. In inducing threat, participants in the diagnostic condition were told the intellectual task was a real test of one’s verbal ability while participants in the non-diagnostic conditions were given no such prompting. He found that African American students in the diagnostic condition performed significantly worse than White students in the diagnostic condition. African American students in the non-diagnostic conditions performed just as well as White participants. The diagnostic condition caused a cognitive activation of the stereotype which led to an apprehension and decreased performance because of the inherent fear of complying with the expected stereotype. This seminal research can be applied to other groups and minorities.

Other research on stereotype threat supports that these expectations of lowered performance by certain stigmatized social groups in specific areas and situations will lead to a poorer performance. Because many people are unaware of the inaccuracies of stereotypes, they often become regarded as fact (Rothbart & Taylor, 1992). Once the stereotypes are regarded as fact, the environment is set in a way that elicits anxiety and fear of confirming those stereotypes. Those who unjustly suffer prejudicial treatment are likely to internalize feelings of inferiority in areas where they are stereotyped (Allport, 1954), which will result in negative consequences such as poor performance in those areas because of the prejudice. Looking back to Steele and Aronson’s (1995) study, African American students who were not exposed to the stereotype threat performed just as well as white students, but those who did experience the threat internalized the stereotypes and performed worse because of this internalization and the anxiety that comes with it.

In regards to gender stereotypes, people have come to unjustly regard women as being less competent in realms such as mathematics, science, and politics. Steele comments that, similar to

African Americans, the negative stereotypes about women tend to “bear on important academic abilities” (Steele, 1997). Studies have shown that women world-wide, not just in the United States, tend to rate themselves as significantly less confident in mathematic ability as their male counterparts (Watkins, 1996), and they tend to feel less confident in their political knowledge (McGlone, Aronson, & Kobryniewicz, 2006). Croizet, Desert, Dutrevis, & Leyens (2001) provided statistics to support that male students tend to perform better in science and mathematics than do female students, though those same female students performed better than male counterparts on reading achievement tests. This stereotypical poor performance of women in mathematics has developed into an institutional bias as we see even teachers at an educational level unconsciously perpetuating the stereotypes to students (Fennema, 1990). So, it is plausible to contend that an institutional bias could also develop regarding women’s knowledge of politics. The detrimental promulgation of this stereotype to the whole of society gives women the opportunity to identify with the stereotype and develop an anxiety over conforming to it when presented with stereotype threat. Just as the African American students in Steele’s studies experienced anxiety and desire to not be reduced to the negative stereotype, women are likely to feel similar anxiety when faced with conforming to stereotypes.

Because stereotypes are associated to specific groups, further consideration of group belonging is warranted. We do not randomly belong to groups; rather, our personal characteristics often dictate to us membership in a specific group. Tajfel & Turner (1986) contend that we identify ourselves with a group of people based on our self-perception. If a person perceives themselves as a member of a certain group, he or she will choose to identify with that group. Some women may choose to identify themselves with women rather than men because they perceive themselves as such, and the same can be said for numerous other social categories. One’s belonging to a group “constitutes a symbolic identity” (Castano, Yzerbyt, Paladino, & Sacchi, 2002) for individuals. It contributes to one’s social identity, the part of a person’s self-concept that is derived

from acknowledged membership to a given group within society (Tajfel, 1978), and this acknowledgement stems from self-perception of similarity to other members. Ultimately, this categorization of an individual through the use of one's self-perception constitutes an in-group that a person chooses to identify with. An in-group is made up of others who hold a similar self-perception, and an in-group can be developed around certain characteristics and certain attributes such as gender and ethnicity.

Stereotypes develop to generalize behaviors about these various in-groups. Past research on stereotype threat has highlighted this idea (Steele & Aronson, 1995, 1997; Aronson, Lustina, Good, Keough, Steele, & Brown, 1999; McGlone, Aronson, & Kobrynowicz, 2006). Researchers (Steele, 1997; Steele & Aronson, 1995) have used the generalization that African-American students perform worse on certain intellectual tasks than white students. The participants' identification with the African-American group and the awareness of the stereotypes that go with the group influences the significantly different performance of those who experienced stereotype threat and those who did not. White students, whose in-group had not been unfairly stigmatized, performed consistently on the intellectual tasks because societal beliefs about their in-group were not prompted.

A significant gap in the literature exists in that no researcher has identified in-group identification as a protective factor against stereotype threat. However, counterbalancing the reduced performance resulting from being made aware of stereotypes of one's in-group may be possible. Intellectual performance can be hampered by stereotype threat, but "improved by conditions that nullify [the stereotypes]" (Aronson et al., 1999). The current research attempts to explore this by eliciting stereotype threat regarding gender differences under different sex ratios. Mullen and others (1992) note that when our in-group is in majority, we think less about it, but when our in-group is in the minority, there is more identification. So an individual who is a member of a stigmatized group may be able to overcome stereotypes of intellectual performance.

The lack of existing research presents an avenue of study to ask questions concerning the impact of classroom population dynamics, like the ratio of men to women (gender ratio), on academic performance of students. Mullen's (1992) idea of increased indifference to in-group identification when in the majority could very easily impact the effectiveness of a stereotype on one's academic performance.

As mentioned previously, stereotype threat diminishes a person's academic performance out of fear of being reduced to the stereotype, but if one's in-group is in the majority, previous theory (Mullen, 1992) suggests that there is a decreased identification with that group. This could suggest that a stigmatized group being in the majority in the classroom could decrease the effectiveness of stereotypes on academic performance. By manipulating the gender ratio to allow for women to be in the majority, they will not as strongly identify themselves with the female in-group than those who experience their in-group being in the minority. Without readily identifying with the female in-group, being in the majority could allow women to not associate themselves with the stereotypes associated to that in-group. This will allow us to better understand a relationship between in-group identification as manipulated by the ratio of men to women and the effectiveness of stereotype threat.

This study hypothesizes that the condition in which gender ratio is manipulated to place women in the majority will lead to stronger performance by female participants even in the face of stereotype threat compared to women exposed to threat in an equal male to female ratio condition.

## Method

### Participants

The N for the study was 77, 52 female and 25 male, with ages ranging from 17-26. Participants in this study were taken from a pool of undergraduate students at a private Midwestern university. 75.3% of participants were college freshman, 12.9% were sophomores, 5.2% were juniors, and 6.5% were seniors. All participants were of at least 18 years of age and signed either a Consent or Assent form based on age. As they were drawn from a pool of



undergraduate students who had the option to sign up for the research, the sample was not random.

### **Materials**

Each participant was first asked to give basic background information, including age, gender, and home state. After the collection of demographic data, participants were given the assessment of political knowledge. This assessment, written by the researcher, consists of ten questions pertinent to current United States politics. Questions included “who is the secretary of state?” and “who is the vice president?” as well as other inquiries of political awareness. Once the political knowledge assessment was completed, participants were instructed to move on to the self report section of the study. The self report section, also written by the researcher, was geared towards understanding the participants’ individual opinions of his or her performance, performance of same sex peers, and performance of opposite sex peers on the assessment of political knowledge. Answers to questions regarding perception of opposite sex performance were of particular importance. Questions on the scale included “How do you think the opposite sex performed on this quiz?” and “How do you think members of your sex performed on this quiz?” See Appendix 1 for the assessment tool used.

To elicit stereotype threat, participants were told that women had typically done worse than men on the same assessment when it had been administered in the past. Because all participants were in threat conditions, all participants experienced the threat. See Appendix 2 for the stereotype threat script.

### **Design and Procedure**

The design of this experiment is a 2x2 design in which participants were split into two different conditions. Both conditions experienced stereotype threat, but they differed in the gender ratio in the classroom. In one condition, women were randomly assigned to outnumber men in a ratio that was 75% female to 25% male. The second condition maintained an equal female to male ratio. After checking in for the study, participants were randomly assigned to one of the two conditions. Though all participants who chose to participate were included in the sample, both men and women were randomized into the experiment’s two conditions. Random assign-

ment was achieved by participants blindly selecting a number directing them to one of the two conditions. Upon random assignment, participants were taken to a new classroom to complete the assessment. Stereotype threat was elicited. Participants were asked to move on to the self-report section and fill out the questions relating to their gendered out-group and in-group after completing the political knowledge assessment. With the help of a research assistant, the manipulated ratio condition and equal ratio condition were conducted simultaneously.

Participants were given 20 minutes to complete the political knowledge assessment and an additional 10 minutes to complete the self report. The political knowledge task is objective and is scored in aggregate form from 0-10 depending on number of correct answers, and the self report questions are on a Likert scale (1 through 5) or simply yes or no answers. After data collection was complete, the information was entered into SPSS and analyzed with the appropriate statistical measures.

Conditions were run in the spring of 2008 and in the fall of 2008 to obtain a desirable number of participants. The manipulated ratio and equal ratio conditions were conducted simultaneously during both collections, and the same procedure was used on both occasions.

## **Results**

In the manipulated ratio conditions, 75% were female and 25% male. Participants had an average age of 18.8 and reported being Republican (36%), Democrat (31%), and Other (33%). See Table 1 for more demographic information.

A 2x2 factorial ANOVA was used to analyze the interaction between gender and condition (equal ratio or manipulated ratio) in regards to participants’ raw score on the political knowledge assessment. There was no significant interaction found between participants’ gender and the condition they experienced and political knowledge,  $F(1,76) = .95$ ,  $MSE = 5.33$ ,  $p = .33$ . These findings do not lend support to the research hypothesis as it held women in the manipulated ratio condition would score significantly higher than women in the equal ratio condition. In regards to condition alone, this yielded no significant

main effect,  $F(1,76) = .312$ ,  $MSE = 1.75$ ,  $p = .68$ . Gender, on the other hand, did have a significant main effect,  $F(1,76) = 3.92$ ,  $MSE = 22.02$ ,  $p = .05$ ), indicating men scored significantly higher than women. See Table 2 for the mean political knowledge scores across conditions. Figure 1 displays the assessment scores and the interaction of gender and condition on political knowledge.

Because the interaction between ratio and gender was insignificant, further analysis was conducted regarding perception of same sex performance compared to perception of opposite sex performance. Two separate Within-group ANOVAs were conducted, one with men and one with women, to consider the differences between perception of same sex performance versus opposite sex performance. For women, there was a significant difference between their perception of same sex performance compared to opposite sex performance,  $F(1,51) = 35.48$ ,  $MSE = 22.15$ ,  $p = .001$ . Women rated men's performance on the assessment significantly higher than they did other women's performance. Males also had a significant difference between the perception of same sex performance compared to opposite sex performance,  $F(1,24) = 7.29$ ,  $MSE = 3.38$ ,  $p = .01$ . Contrary to women, men rated the performance of their same sex, other men, significantly higher than they perceived the performance of women on the assessment. See Figures 2 for the means of men and women's perceptions same and opposite sex performances.

Because of these findings, a between-groups ANOVA was conducted for women's perceptions of same sex scores in the manipulated ratio condition versus the equal ratio condition. Results indicated a trend in which women in the manipulated ratio condition tended to perceive other women's performance on the assessment higher than the perceptions of women in the equal ratio condition,  $F(1, 51) = 2.34$ ,  $MSE = .29$ ,  $p = .132$ . Subsequent analysis was run to obtain the effect size of this trend,  $ES = .21$ . Because the effect size is reasonable to pursue, further analysis with increased power should be conducted. See Table 3 for a representation of the means of perception in the manipulated and equal ratio conditions.

## Discussion

The results of this study present partial support for the research hypothesis. It was believed there would be a significant difference between the assessment scores of women in the manipulated ratio and women in the equal ratio condition, there was none. Therefore, one cannot conclude from this data that there is evidence to show gender ratios can be effective in nullifying the negative effects of stereotype threat on the actual assessment. Women did score lower when presented with threat similar to findings in previous research (Steele & Aronson, 1995; Steele, 1997; Aronson et al., 1999; Croizet, Desert, Dutrevis, & Levens, 2001; McGlone, Aronson, Kobrynowicz, 2006), but there is no evidence that manipulating sex ratios has an impact on assessment score.

However, the trend in which women in the manipulated ratio condition perceive other women to perform better on the assessment than women in the equal ratio condition might suggest that in-group identification is in part protective. It was hypothesized that manipulating the ratio would protect female participants from the negative effects of the stereotype threat, and clearly, female participants experiencing the manipulated ratio reporting a belief that other women are more capable of higher performance suggests a degree of protection from the threat. Perception of female performance by women is arguably more significant than assessing political knowledge. A higher perception suggests that the gender ratio may be protective as it serves as a pathway by which the strength of the stereotype is minimized. Scores on the political knowledge assessment could have been swayed by political ignorance or other factors apart from the stereotype threat, but women experiencing a favorable gender ratio could serve as a means of mitigating stereotype threat.

Despite only partial support for the hypothesis, the findings of the perceptions of same sex versus opposite sex offers an interesting understanding of the stereotyping that occurs in regards to political knowledge. The results indicate that women think men will perform significantly better than other women and men think women will score significantly

worse than other men. This difference between perceptions of performance is a clear indication that a real stereotype does exist as women overall perceived men were significantly more politically aware than other women would be. These perceptions of performance, as well as actual performance, recognize that women are obviously stereotyped when it comes to political knowledge.

The existence of this stereotype contains overtly negative consequences, but the trend for women in the manipulated ratio to perceive women's knowledge as higher also suggests the adoption of these stereotypes can be protected against. The protective factor of a manipulated ratio has clear implications when considering gender dynamics within the educational institution. Though women still appear to perceive men as more politically aware, they are willing to believe other women are capable of political awareness, contrary to the presented stereotype. Women rated other women as less politically knowledgeable as men despite their numeric majority in the manipulated ratio. This acceptance of the stereotype, as evidenced by female perception of other women, could express an internalization of the stereotype leading to overall poorer scores for female participants.

Even if women were in the clear majority, they still accepted the stereotypes and continue to show a decreased performance on the quiz. The female and male acceptance of the stereotype claiming women are less politically aware is clear and suggests that the inequality in academia is a broad institutional and social issue. Socially, we have fostered an institution based on power that pursuing higher education. If combined with addressing necessary social change, manipulation of gender ratios may allow the educational institution to dilute unfair stereotyping that leads to the perpetuation of stereotypes to future generations and continues to limit motivation of women who unjustly suffer these prescribed roles.

Despite the suggested trend, limitations do exist in this study. First, the sample size is small. However, power analysis suggests, with a higher number of participants, significant results might be found. Second, the timing of collections could be considered a limitation. Though the time difference existed to allow for a higher number of participants and

assessment outcomes did not statistically differ, the timing of collections may have influenced political awareness. For example, those participating in the fall 2008 collection could have been more politically aware in that moment because of the closeness of the 2008 presidential election. Finally, the trend suggests women might be protected from stereotype threat because of in-group identification. The participants were not tested for in-group identification during the study. Without a direct measure of in-group identification, one can only speculate that gender ratio protects against stereotype threat through this process. The inclusion of data regarding in-group identification presents the opportunity for further study in this area to strengthen the belief that a manipulated gender ratio serves to protect against stereotype threat.

Continuing research in this area is imperative to better understanding gender dynamics in academic settings. The inclusion of assessments to measure for the level of in-group identification is imperative in future research in order to appropriately gauge its effectiveness in protecting against stereotypes. Future research should also expand beyond the political realm and conduct similar studies with gender ratios and stereotype threat in using other stereotyped academic realms such as natural sciences or mathematics. Such research would include the same gender ratio dynamics as well as the eliciting of stereotype threat but differ in regards to the academic stereotypes being utilized and subject matter being tested. Expanding into other academic realms will allow us to see if gender ratios do not influence areas in academics beyond politics, such as mathematics and the natural sciences, which will contribute to a more expansive understanding of the implicit stereotyping in education.



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Table 1

*Participant Demographic Information*

Characteristic	Men (n = 25 [32.5%])	Women (n = 52 [67.5%])	Total (n = 77)
Average Age	19.2	18.7	18.8
Party Affiliation			
Republican	10 (40%)	18 (34%)	28 (36%)
Democrat	4 (16%)	20 (39%)	24 (31%)
Independent	3 (12%)	4 (8%)	7 (9%)
Other	8 (32%)	10 (19%)	18 (23%)
Year in School			
Freshman	19 (76%)	39 (75%)	58 (75.3%)
Sophomore	3 (12%)	7 (13%)	10 (12.9%)
Junior	1 (4%)	3 (6%)	4 (5.2%)
Senior	2 (8%)	3 (6%)	5 (6.5%)

Table 2

*Scores on Political Knowledge Assessment by Condition*

Condition	Male		Female		Combined	
	n	M(SD)	n	M(SD)	n	M
Manipulated Ratio	12	5.25(2.45)	35	4.66(2.33)	47	4.95
Equal Ratio	13	6.15(2.58)	17	5.16(2.49)	30	5.28

Table 3

*Female Perceptions of Same Sex Performance in Manipulated Versus Equal Ratio Conditions*

Measure	<u>Manipulated Ratio</u>		<u>Equal Ratio</u>		<i>p</i>
	<i>n</i>	<i>M(SD)</i>	<i>n</i>	<i>M(SD)</i>	
Perception of Same Sex Performance	35	2.57 (.69)	17	2.23 (.83)	.132

## Appendix 1

### Political Knowledge Assessment Demographic Information

Gender: \_\_\_\_\_

Age: \_\_\_\_\_

Year in School: \_\_\_\_\_

Major: \_\_\_\_\_

Political Party Affiliation: \_\_\_\_\_

Home State: \_\_\_\_\_

#### Political Knowledge Quiz

For each question below, write in your answer in the space provided.

1. Name a senator from your home state.
2. In what month is the President Elect inaugurated?
3. Who is the Secretary of State?
4. How many Supreme Court justices are there?
5. What Supreme Court case legalized abortion?
6. Who is the Vice President?
7. Which political party currently controls Congress?
8. Who is the Speaker of the House?
9. What law passed by Congress allows for only heterosexual marriage?
10. In what year did the current United States conflict with Iraq begin?

For the following questions, circle the answer you feel is best.

How do you feel about your performance on the quiz?

(Not confident) 1   2   3   4   5 (Very Confident)

How would you rate your level of political knowledge?

(Very Low) 1   2   3   4   5 (Very High)

Would you rate yourself as a politically oriented person?

(Not at all) 1   2   3   4   5 (Very much so)

In comparison to your opposite sex, how do you think you performed?

(Worse) 1   2   3   4   5 (Better)

How do you think the opposite sex performed on this quiz?

(Very Poor) 1   2   3   4   5 (Very Well)

How do you think members of your sex performed on this quiz?

(Very Poor) 1   2   3   4   5 (Very Well)

Do you feel there is a gender gap in political knowledge?

\_\_\_\_ Yes - men generally have more political knowledge than women

\_\_\_\_ Yes - women generally have more political knowledge than men